ILLINOIS WATERWAY, LA GRANGE LOCK AND DAM
3/4 mile south of Country 795N at Illinois River
Versailles vicinity
Brown
Illinois

HAER IL-164-A
IL-164-A

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C Street NW
Washington, DC 20240-0001

HISTORIC AMERICAN ENGINEERING RECORD

ILLINOIS WATERWAY, LA GRANGE LOCK AND DAM

HAER NO. IL-164-A

Location:	¾ mile south of County 795N at Illinois River, Versailles vicinity, Brown County, Illinois, on Illinois River Latitude: 39.9416472; Longitude: -90.5342067
Present Owner:	U.S. Army Corps of Engineers, Rock Island District
Present Use:	Navigation of Illinois Waterway
Significance:	La Grange Lock and Dam is significant as a component of the Illinois Waterway, which was developed to provide a navigable route from Lake Michigan to the Mississippi River and beyond. La Grange Dam is significant as one of the few surviving examples of a dam with Chanoine wicket gates in this country.
Historian:	Justine Christianson, HAER, 2008
Project Information:	The Illinois Waterway Recording Project (2007-2008) is part of the Historic American Engineering Record (HAER), a long-range program to document historically significant engineering and industrial works in the United States. HAER is administered by the Heritage Documentation Programs, a division of the National Park Service, U.S. Department of the Interior, Richard O'Connor, Manager. The U.S. Army Corps of Engineers (USACE) funded the project. Ron Deiss, USACE, and Dana Lockett, HAER Architect, served as project managers. Dana Lockett and Anne Kidd produced the measured drawings. Large format photography was done by Brian Grogan. Justine Christianson wrote the historical reports. Research assistance was provided by John Fitzgerald, Archivist, USACE.

Part I. Historical Information

A. Physical History:

1. **Date of Construction:** 1936-39
   The lock, dam, and control station were designed and built from 1936-1939. Maneuver Boat No. 1 was delivered to the site in 1938.[1]

2. **Architect/Engineer:**
   A.F. Griffin of the Army Corps designed the site, including the dam, lock and field office. The control station, designed by Paul Le Gromwell of the Chicago District, is identical to the one at Peoria.[2]

3. **Builder/Contractor/Supplier:**
   Kansas City Bridge Company of Kansas City, Missouri built the lock while Bass Engineering and Construction Company constructed the control station. Independent Bridge Company of Pittsburgh supplied the metalwork for the lock and dam with Hunter Steel Company as a subcontractor.[3]

   The Calumet Shipyard & Dry Dock Company built Maneuver Boat No. 1.[4]

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[1] Mary Yeater Rathburn, American Resources Group, Ltd., "Architectural and Engineering Resources of the Illinois Waterway between 130th Street in Chicago and La Grange," Volume 2, prepared for U.S. Army Corps of Engineers, Rock Island District, Rock Island, Illinois, October 1996, pp. 503-507, 513.

[2] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 503, 507, and 509; Barbara J. Henning, "La Grange Lock and Dam Historic District," National Register of Historic Places Nomination Form, 2001, Section 7, Page 2.

[3] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 507.
The control station was constructed under Contract W-1088-Eng-1038 by Bass Engineering & Construction Company, who subcontracted the manufacture of the various components of the building. The actual construction materials for the control station included "cast stone" supplied by the Algonite Stone Manufacturing Company of Oklahoma City, Oklahoma, roof slabs and cover plates from Precast Slab and Tile Company, structural steel and iron from Joseph T. Ryerson and Son, Inc., and miscellaneous components like steel sash and nuts and bolts from Ceco Steel Products Corporation. The electric work was subcontracted to Graybar Electric Company, who in turn subcontracted to other companies. L.A. Millbrook Company of Maywood, Illinois manufactured the junction boxes, while all the cable came from National Electric Products Corporation. The control station was used to operate and monitor the locks and consequently housed pumps with accompanying motors, provided by Worthington Pump and Machinery Corporation of Harrison, New York. The Harvey Foundry Pattern and Machine Company of Detroit, Michigan manufactured the automatic swing check valve assembly. The switchboard, oil and air pressure regulators and fuel pump were purchased from Cutler-Hammer, Inc. of Milwaukee, Wisconsin. The Climax Engineering Company provided the standby unit with engine and generator. John Petersen Manufacturing Company supplied the storage tank and gasoline supply tank. Two tow haulage units, consisting of single drum electric tow haulage winches with motors and control equipment, came from the Clyde Iron Works of Duluth, Minnesota. The cast steel check valve was provided by Crane Company of Detroit, who obtained the cast iron case pressure gauges from Manning Maxwell & Moore, Inc. of Bridgeport, Connecticut. The hydro-pneumatic accumulator tank was supplied by Babcock and Wilcox Company of Barberton, Ohio. See Folder 821.1, (New La Grange L&D), in U.S. Army Corps of Engineers, Chicago District, Record Group 77, National Archives and Records Administration, Great Lakes Region, Chicago (hereafter cited as RG 77, NARA, Chicago).

[4] Folder 560 (300/262) in U.S. Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago.

4. **Original Plans:**
A site plan from 1975 shows the site layout, with a cluster of buildings to the south of the access road and west of the lock and dam that included the lockkeepers' houses, a storage building, and pump house. The lock and dam site consisted of the control station centered on the landward edge of the lock, the lock with miter gates, and the dam with wicket gates extending across the river.[5]

5. **Alterations and Additions:**
In the 1970s, tow haulage units consisting of "two identical motorized winch assemblies" were built by American Heist & Derrick Company to pull barges into or out of the lock. The units were identical to those at Lockport, Brandon Road, Marseilles, Dresden Island, Starved Rock, and Peoria and similar to ones installed on the Upper Mississippi River.[6]

The tops of the lock walls were resurfaced and concrete guidewalls installed to replace the original sheet piling ones in 1984. The Rock Island District undertook further rehabilitation work on the lock from 1987-88.[7]

In 1990, the Army Corps had twenty-eight of the wicket gates located at the western end of the dam removed and a Tainter gate installed in their place.[8] The control station underwent a renovation that same year, which included replacing the second story windows, removing the first floor windows and closing in the openings, replacing the roof and restoring the masonry.[9]

Maneuver Boat No. 1 was altered in the 1990s when the original gate lifter was replaced by an excavator. The alteration necessitated construction of a 14' x 8' addition at the back of the boat. Wood paneling was installed as a replacement siding in 2001.[10]

B. Historical Context

Capt. Garrett Lydecker of the Army Corps studied the river to insure its navigability. He recommended that a lock and dam be built at La Grange and at Kampsville in 1877. Congress approved this plan, and by 1889 a lock and dam had been completed

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[5] U.S. Army Corps of Engineers, Chicago, Illinois, "La Grange Lock and Dam, Illinois Waterway, Illinois, Proposed Lock," 30 June 1975, Sheet 2 of 2.
[6] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 515.
[7] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 507; Mary Yeater Rathburn, American Resources Group Ltd., "Architectural and Engineering Resources of the Illinois Waterway between 130th Street in Chicago and La Grange, Illinois," Volume 1, prepared for the U.S. Army Corps of Engineers, Rock Island District, Rock Island, Illinois, October 1996, p. 104.
[8] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 503.
[9] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 513.
[10] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 505; Henning, "La Grange Lock and Dam Historic District," Section 7, Pages 2, 3. The boat's boiler was converted at some point from coal to fuel oil.

at La Grange. In 1904, Congress authorized the reduction of the dam height by 2' to aid open navigation of the Illinois River. The work was completed in 1905-6 under Maj. Thomas H. Handbury of the Army Corps of Engineers.[11] There were problems with leaking at the lock, as well as with the poor condition of the gates, filling valves and head-bay floors.[12]

The 1935 Rivers and Harbors Act included a recommendation that due to an upcoming court mandated decrease in the allowable amount of water diversion from Lake Michigan, the original locks and dams at La Grange and Kampsville should be removed and new ones built at Peoria and La Grange. The act followed the December 6, 1933 recommendation by the Chief of Engineers, who stated in order "to provide a fully useful commercial waterway," the channel should be altered to 9' deep and 300' wide below Lockport and that "modern" locks and dams should be built at Peoria and La Grange.[13] After Congress granted its approval, A.F. Griffin of the Army Corps' Chicago District designed a new lock and dam to be built at La Grange and Peoria.[14] The plans called for construction of an Ohio River Standard Navigation lock, a dam with wicket gates, and an International style control station, designed by Paul Le Gromwell. Historian Mary Yeater Rathburn notes that Le Gromwell was probably influenced by the 1933 Century of Progress Exposition in Chicago.[15] The dam was modeled after nineteenth century dams at Henry, Copperas Creek, and Kampsville, which had Chanoine wickets set on a concrete sill.[16] The use of wicket gates in the dams rather than the Tainter gates used elsewhere on the waterway can be attributed to a number of factors. The use of Chanoine wicket gates rendered the dam not just movable but also navigable when the gates were in the lowered position. Navigable dams were useful in those sites where extended periods of open river navigation were possible, such as at the lower end of the Illinois River where La Grange and Peoria were located.[17] Wicket gates were also recommended for use on large rivers where rapid flooding was a possibility because they were "not easily disabled, can be maneuvered rapidly" and did not contain a great number of "loose parts." The rapidity with which the wickets could be raised and lowered was also seen as an

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[11] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, pp. 40-42.
[12] U.S. Army Corps of Engineers, *Annual Report of the Chief of Engineers, U.S. Army* (Washington, DC: Government Printing Office, 1931), pp. 1280-81 (hereafter cited as USACE, *Annual Report*, date of publication).
[13] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, p. 91; USACE, *Annual Report*. 1934 p. 855.
[14] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, p. 95; USACE, *Annual Report*, 1933, p. 735.
[15] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, p. 95.
[16] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, p. 91.
[17] William Patrick O'Brien, Mary Yeater Rathburn, and Patrick O'Bannon, edited by Christine Whitacre, *Gateways to Commerce* (Denver: National Park Service, Rocky Mountain Region, 1992), p. 41. They point out that non-navigable dams, such as those found elsewhere on the waterway, were able to allow "accurate regulation of pool heights" since they had more flexibility in opening than wicket gates, which can only be fully raised or fully lowered. In addition, "the higher sills of non-navigable dams also ensured a minimum pool level." Wicket gates are costly to maintain and operate, factors that ultimately caused the Army Corps to replace the wicket gates on the Ohio River with roller and Tainter gates.

advantage.[18] The location of the proposed La Grange and Peoria locks and dams on the lower end of the river and waterway coupled with the area's tendency to flood regularly undoubtedly influenced Griffin to choose wicket gates for the new dams.

In 1936, preliminary work began on the new lock and dam site at La Grange.[19] The following year, the Army Corps reported that the lock and dam were 46 percent complete.[20] Two years later, construction had been completed, including dredging and installing the sewer, water and telephone lines.[21] Removal of the old lock and dam was advertised in 1939, but all the bids were rejected as being "excessive." The Army Corps decided to use government plant with additional hired labor. The work was done by the Chicago and Saint Louis districts in August 1939. The Saint Louis District provided the labor and performed the removal while the Chicago District served as overseer.[22] La Grange Lock and Dam opened for use in 1939. Various auxiliary buildings have been added to the site and alterations have been made to the original equipment throughout the site's operational history.

Part II. Structural/Design Information

A. General Description[23]

The site includes the dam, lock, control station, Maneuver Boat 1 and THE BEARDSTOWN plus auxiliary structures like the old field office, pump house, tow haulage units, control stands, comfort station and new maintenance building.[24]

The 1066' long dam across the Illinois River consists of a 136' concrete regulating weir at the east end and a concrete pier dam made up of 109 Chanoine wicket gates and one Tainter gate that can be fully submerged.[25]

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[18] B.F. Thomas and A.D. Wyatt, *The Improvement of Rivers: A Treatise on the Methods Employed for Improving Streams for Open Navigation and for Navigation by Means of Locks and Dams* (New York: John Wiley & Sons, Inc., 1905), p. 239; Edward Wegmann, *The Design and Construction of Dams Including Masonry Earth, Rock-Fill, Timber and Steel Structure. Also the Principle Types of Moving Dams* (New York, John Wiley & Sons, 1922), p. 331.

[19] USACE, *Annual Report*, 1936, p. 943; Folder 821.1, (New La Grange L&D) in U.S. Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago.

[20] USACE, *Annual Report*, 1937, p. 977.

[21] USACE, *Annual Report*, 1939, p. 1220.

[22] Folder 821.1, (Old La Grange L&D) in Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago.

[23] Description based on Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 497-532 and fieldwork done by the HAER recording team in 2007 and 2008.

[24] Inventory done by Mary Yeater Rathburn in "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 503-532. The lock, dam, and control station were determined to be contributing resources while Maneuver Boat No. 1, THE BEARDSTOWN, comfort station, tow haulage units, storage building, pump house, and maintenance building were determined noncontributing, see Barbara J. Henning, "La Grange Lock and Dam Historic District," 2001.

[25] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 503-504.

To the west of the dam is the Ohio River Standard Navigation lock, which has a 110' x 600' chamber with reinforced concrete walls and an 11' lift. The lock has steel miter gates at both its upstream and downstream ends that are operated by electric motor assemblies. Ten rectangular ports measuring 5' x 3'-6" are located along the bottom of each lock wall. The ports extend from a 12' diameter culvert that runs through the interior of the chamber walls and ends in an intake located just outside the lock gates at the upstream end of the chamber. The difference in size between the ports and culvert diameter was planned in accordance with the Venturi principle, which states that the pressure of water is increased by movement through a constricted opening.[26] Four valves operated by hydraulic machinery regulate the flow of water through the culverts.[27]

Centered on the landwall of the lock is the control station, a 3,500 square foot, two story building measuring 70' x 25' and 36' tall. It is identical to the one at Peoria and similar to three built by the Rock Island District on the Upper Mississippi River that date to 1934-36 (Lock and Dam Sites 13, 14, and 17). The concrete building with a flat roof has a facing of cream brick laid in stretcher bond. The symmetrical front and rear facades are divided into five bays by brick pilasters topped with cast stone caps. The second story windows are topped by fanlights while the first floor ones have been removed and the openings filled in due to the regular flooding and subsequent window breaking that occur at the site at least annually. Doors centered on both the front and rear facades and feature concrete surrounds with Art Deco detailing. The interior space has been arranged to minimize flood damage.[28]

Structures associated with the operation of the lock include two tow haulage units dating to the 1970s that consist of motorized winch assemblies used to pull barges from the tow into or out of the lock. The units are located at each end of the lock's landwall. Their purpose is to let "parts of a fleet of barges to be locked through while not attached to their tow boat, thus making it possible to lock large modern units through without repeatedly detaching tow from the barges immediately in front of it."[29]

Two control stands (also called "dog houses") were built in the 1980s on the landward side of the lock chamber at the upstream and downstream ends. The 52 square foot, one room, one story metal buildings have flat roofs with overhanging eaves. Windows on all four walls provide unobstructed views of the lock chamber to the operator. The control stands protect the switches needed to operate the lock gates

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[26] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 507-508; M.G. Barnes, "The Illinois Waterway," *Journal of the Western Society of Engineers* XXVI, no. 5 (May 1921): p. 180; L.D. Cornish and Walter M. Smith, "Engineering Features of the Illinois Waterway," *Journal of the Western Society of Engineers* 31, no. 5 (May 1926): pp. 178-182.
[27] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, p. 71.
[28] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 513-14; Henning, "La Grange Lock and Dam Historic District," Section 7, Page 2.
[29] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 515.

and valves. Due to the regular flooding at the site, the control stands sit on skids so they can be moved during periods of high water. The periodic flooding also affected the location of the gate operating machinery, which at other sites along the Illinois Waterway had been moved out of pits in the lock walls and located above ground. At Peoria and La Grange, however, the machinery was left in its original position in the lock walls.[30]

Maneuver Boat No. 1 is a 64.5' long x 30' wide work barge with a 3'-8" hull that raises and lowers the dam's Chanoine wicket gates. Originally, this was done with a steam operated, permanently mounted gate-lifter that was similar to a crane.[31] In the 1990s, a Caterpillar brand excavator "fitted with a wicket-lifting hook at the end of its bucket" was installed in place of the gate-lifter, a modification that won the Golden Hammer award.[32] The installation of the excavator necessitated alterations to the boat, including a 14' x 8' addition and re-cladding the boat's exterior with vertical wood paneling in 2001.[33]

THE BEARDSTOWN, dating to 1972, is a 26' long x 12' wide diesel engine, single screw 380 horsepower push boat. A one-story cabin holds the diesel engine. The pilot house is located on top of the cabin. THE BEARDSTOWN pushes Maneuver Boat No. 1 into position so it can operate the dam's wicket gates. It is nearly identical to THE SANGAMON, which operates at Peoria Lock and Dam, even though different manufacturers built the boats. (See Appendix A, Figure 2)[34]

An access road extends from the control station, passes a cluster of buildings associated with the maintenance and operation of the lock and connects with the main road. Spurs from this access road lead to the cluster of buildings, which include a pump house, the field office, a maintenance building, and a comfort station. The 300 square foot, one story, one room pump house has a gable roof and is located south of the access road and behind the field office. The pump house dates to 1938. The field office is a 1,196 square foot, one story, frame building with a gable roof. Built in 1937 to serve as the base of operations during the construction of the lock and dam, the field office has the distinction of being the oldest structure on the site.[35] After the field office, another turnoff from the access road leads south to a new maintenance building, located on the site of the 1939 lockkeepers' houses. The one story metal structure was added to the site in 1992 because the control station flooded with 10' to

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[30] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 519-22.
[31] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, p. 95 and Volume 2, p. 505.
[32] The Golden Hammer award was established in 1993 by Vice President Al Gore to recognize federal, state and local teams of employee who developed ways to reduce governmental costs and bureaucracy and increase efficiency.
[33] Henning, "La Grange Lock and Dam Historic District," Section 7, Pages 2-3.
[34] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, pp. 517-18; Henning, "La Grange Lock and Dam Historic District," Section 7, Page 3.
[35] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 509-12.

12' of water at least once a year.[36] The final building in this cluster of development is the 1970s era comfort station that is identical to the one at the Thomas J. O'Brien Lock and Control Works. The 414 square foot, one story building has a gable roof, scored concrete walls, and is divided into separate facilities for men and women.[37]

B. Construction

The Army Corps awarded the contract for lock and dam construction to the Kansas City Bridge Company of Kansas City, Missouri, in 1936. To facilitate construction of the lock, the company built a cofferdam whose upper, lower and river arms were made of forty-three interlocked steel sheet pile cells filled with sand and sand banking. A small earth dike on the land side connected the upper and lower arms of the cofferdam.[38] Bass Engineering and Construction Company won the contract to build the control station. The roadway accessing the site and an esplanade along the landward side of the lock chamber were built by Ira M. Dudley of Springfield, Illinois. In addition to overseeing the construction work, the Army Corps had to determine the fate of five existing residences on the site associated with the operation of the original La Grange lock and dam. Army Corps officials entertained the idea of moving four of the buildings to other sites, but ultimately decided to lease the buildings rather than undertake moving them.[39]

There was some discussion about the construction of the wicket gates of the dam. In a letter from A. Fletcher Marsh of Marsh & Truman Lumber Company to the U.S. Engineer Office in Chicago dated May 28, 1937, Marsh requested clarification on the specifications for the wickets. He went on to explain: "in the old days the Government used to buy No. 1 Common White Oak rough or dressed and make the Wickets up themselves. This habit is still followed by the Huntington office, but in recent years, the Louisville office has had the Wickets fabricated by an outside contractor (American Car and Foundry). In connection with the La Grange Dam the question has come up of these wickets being made by outside contractors which raises a question then as to what will be acceptable to the U.S. Engineer."[40] No response to this request was found.

C. Operation

The Chanoine wicket gates consist of a row of wooden shutters (also called leaves). Each wooden shutter is supported by a framework known as a "horse" that contacts the back of each shutter at nearly the center point. The horse creates a horizontal axis of support that keeps the shutter up at a slight angle. The part of the shutter above the

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[36] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 531-32.
[37] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 529-30.
[38] Folder 821.1, (New La Grange L&D), in Army Corps of Engineers, Chicago District, RG 77, Entry 347, NARA, Chicago.
[39] Folder 624, Lockkeepers Buildings-General (1933-1941), in U.S. Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago; Folder 611 (New La Grange L&D), in U.S. Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago.
[40] Folder 821.1, (New La Grange L&D), in U.S. Army Corps of Engineers, Chicago District, RG 77, NARA, Chicago.

axis is known as the "head" or "chase" while the part below is known as the "breech" or "butt." The horse and shutter are kept upright by a long prop that extends at approximately a 45 degree angle from the bank of the shutter to the hurter, a structural framework located on the dam's floor.[41] On the Illinois Waterway, the Chanoine wicket gates were kept lowered during extended periods of high water. If necessary, the wickets were raised by personnel on maneuver boats. The process of lowering the gates involved dislocating the prop end, which then caused the pressure exerted by the water to push the shutter down on top of the hurter, prop and horse. To raise the wickets, the shutters were lifted so the prop fell in place.[42] Rathburn describes the process at Peoria Dam, which is similar to that at La Grange.

> Positioning the port side of *Maneuver Boat No. 2* against the upstream side of the dam, the crew attaches a metal hook to the underwater gate by hand and then connects the other end of the hook, its eye, to the steam-operated gate lifter crane permanently mounted on the boat. The gate-lifter operator then pulls the gate up into the vertical position. A diagonal prop, braced out from the wicket on the upstream side by a 'horse,' holds the gate in place. Once this is done, a winch, called the return engine, pulls the boat into position to lift the next wicket in line….The same procedure used for raising the dam is used in reverse for lowering it when the water levels rise sufficiently.[43]

The installation of the excavator on Maneuver Boat No. 1 further streamlined the process. (See Appendix A, Figures 1 and 3)

During those periods when the wicket gates were raised, the lock had to be put into operation. The process of locking through barges at the downstream end of the lock heading upstream involves closing the upstream gates and opening the downstream ones. The barges are then moved into the chamber and downstream gates closed. Intakes located just outside the upstream gates draw water into the culverts, and the water then flows through the culverts, out the ports and into the chamber. The incoming water raises the barges up to the level of the upper pool. The upper gates are then opened, and the barges are maneuvered out of the lock and into the upper pool. The operation is reversed for barges heading downstream.[44]

The Illinois Waterway had originally been designed for use by "towboats pushing eight jumbo hopper barges." The jumbo barges each measured 35' x 195'. The configuration of the eight barge tow with a towboat consisted of two rows of three barges tied together followed by a row of two barges tied together. The towboat pushed the three rows into position in the lock chamber, then moved alongside the

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[41] Detailed descriptions of Chanoine wicket dams are available in Thomas and Wyatt, pp. 227-232 and Wegmann, pp. 327-331.
[42] See Wegmann, p. 330, and Thomas and Wyatt, p. 231.
[43] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, pp. 91-92.
[44] See Thomas and Wyatt, *Improvement of Rivers*, p. 147.

first row (made up of two barges) during the lockage. The resulting configuration measured 105' x 600', which allowed all the barges to be locked through in one pass since the lock chamber conformed to the Ohio River Standard of 110' x 600'. By the 1950s, the fourteen barge tow had become the standard. While the Thomas J. O'Brien Lock with its 110' x 1000' chamber could handle this larger tow configuration, the earlier locks could not. The fourteen barge tow measured 105' x 985', requiring that the tow be broken into two, known as "cuts," on the other locks. The first cut was made up of two rows of three barges tied together. The second cut followed the standard configuration used in the eight barge tow. Rathburn describes the locking through process with the fourteen barge tow configuration.

> After breaking the two into these two cuts, the towboat pushed the first cut of barges through the lock, locked through with it, pushed the cut out of the lock, locked back through to get the second cut of barges, pushed it into the lock, moved over into the 'third barge slot' in the last row of the eight-barge configuration, locked through with the second cut, and then reassembled the two cuts into one united configuration and moved back into its pushing position.[45]

This process was time consuming and caused congestion along the waterway, so the Army Corps installed tow haulage units in the 1970s at all the locks except Thomas J. O'Brien. These units allowed the first cut to be pulled through the lock without the towboat, which remained in its position in the second cut. This minimized some of the time spent locking through. The installation of the tow haulage units facilitated the use of seventeen barge tow configurations, measuring 105' x 1118'. In this configuration, the first cut is made up three rows of three barges. The second cut has two rows of three barges while the last row has two barges and an open slot for the towboat.[46]

From the 1930s to the 1970s, the amount and size of the vessels using the Illinois Waterway increased. In 1934, commercial traffic on the waterway amounted to 104,750, which increased by 1953 to 20 million.[47] Traffic on the waterway leveled in

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[45] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, p. 99.
[46] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, pp. 100-102.
[47] Department of Public Works & Buildings, "132 Years of Public Service: The History and Duties of the Division of Waterways," (State of Illinois, 1955), p. 15.
Illinois Waterway traffic statistics are provided in the U.S. Army Corps of Engineers' Annual Reports. The information is presented in various ways throughout the 1930s. In 1931, the upbound traffic on the Illinois River (from La Salle to Grafton, IL) consisted of 128 steamers, 609 motor vessels, 21 sailing vessels, and 457 barges for a total of 1,215 vessels. The downbound traffic included 140 steamers, 515 motor vessels, 21 sailing vessels, and 400 barges for a total of 1,076 vessels. (USACE, *Annual Report*, Part II, 1932, p. 696.) By 1933, traffic had increased to a total of 2,140 upbound vessels at 341,760 tons, consisting of 50 steamers, 1,251 motor vessels, 772 barges, and 67 other types. Downbound traffic numbered 2,290 vessels at 344,249 tons, including 50 steamers, 1,282 motor vessels, 756 barges, and 202 other types. In 1934, the total numbers of vessels had declined but the tonnages increased, with upbound tonnage at 642,715 and downbound at 682,214. (USACE, *Annual Report*, Part II, 1934, p. 670 and Part II, 1935, p. 710.) In 1935, the statistics for the Illinois Waterway also included the Chicago Sanitary & Ship Canal and the Calumet-Sag Canal. The total tonnage was 1,361,280. On the South Branch of the Chicago

the 1970s but congestion on both the Illinois Waterway and the Upper Mississippi River continues. According to a recently released study of the two systems dating to 2005, 51.6 million tons of commercial cargo worth $9.5 billion was transported on the Illinois Waterway. Together the two systems move 60 percent of corn exports and 45 percent of soybean exports, in addition to coal, chemicals and petroleum.[48]

La Grange Lock and Dam site is significant for its extant wicket gates, which are a rare surviving example. As noted in the 1996 inventory of the waterway, the only other surviving Army Corps facilities with Chanoine wicket gates are at Peoria and two sites on the Ohio River. From 1878 to the 1930s, "wicket dams…were the only kind of bank to bank structures the Corps built."[49] In order to raise and lower the wicket gates, the Corps had Maneuver Boat No. 1 built specifically for the site. Its original design was almost identical to that of Maneuver Boat No. 2 built for use at Peoria Lock and Dam. The maneuver boats are also significant as some of the last examples of the type.[50]

Part III. Sources of Information

A. Primary Sources

U.S. Army Corps of Engineers, Chicago District. Record Group 77, National Archives and Records Administration, Great Lakes Region, Chicago.

U.S. Army Corps of Engineers. *Annual Report of the Chief of Engineers, U.S. Army.* Washington: Government Printing Office, 1931, 1933, 1937, and 1939.

B. Secondary Sources

Henning, Barbara J. "La Grange Lock and Dam Historic District." National Register of Historic Places Nomination Form, 2001.

River, 215,107 tons were carried. Total tonnage, including rafted traffic, was 1,584,428 tons worth $48,710,394. (USACE, *Annual Report*, Part II, 1936, p. 747.) In 1936, 1,537,759 tons were transported on the Illinois Waterway and 507,805 tons were moved on the South Branch of the Chicago River. The total tonnage was 2,048,057, including rafted traffic, for a total value of $54,725,585. (USACE, *Annual Report*, Part II, 1937, p. 781.) In 1937, 2,874,864 tons were transported on the Illinois Waterway and 698,329 tons on the South Branch of the Chicago River. The total tonnage, plus rafted traffic, equaled 3,575,299 tons worth $65,604,398. (USACE, *Annual Report*, Part II, 1938, p. 803.) By 1938, the total tonnage on the Illinois Waterway (which included the Chicago Sanitary & Ship Canal, Calumet-Sag Canal, and South Branch of the Chicago River) was 4,446,493, including rafted traffic, at a total worth of $109,008,794. (USACE, *Annual Report*, Part II, 1939, p. 863). From 1975-86, the amount of goods shipped on the waterway decreased from 48.5 million to 42.3 million. (Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 1, p. 103).

[48] See Final Draft, "Re-Evaluation of the Recommended Plan: UMR-IWW System Navigation Study, Interim Report," issued March 2008, available at http://www2.mvr.usace.army.mil/UMRS/NESP/ (accessed March 2009).

[49] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 503.

[50] Rathburn, "Architectural and Engineering Resources of the Illinois Waterway," Volume 2, p. 505.

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Thomas, B.F. and D.A. Wyatt. *The Improvement of Rivers: A Treatise on the Methods Employed for Improving Streams for Open Navigation, and for Navigation by Means of Locks and Dams*. New York: John Wiley & Sons, 1905.

Wegmann, Edward. *The Design and Construction of Dams Including Masonry Earth, Rock-Fill, Timber and Steel Structures. Also the Principle Types of Moving Dams*. New York: John Wiley & Sons, 1922.

C. Likely Sources Not Yet Investigated

Research was conducted in the Army Corps of Engineers records (Record Group 77) at the National Archives and Records Administration, Great Lakes Region, Chicago, but time constraints prevented thorough research of all records. Additional information may be available.

Appendix A: Images

Figure 1: Maneuver Boat No. 1 raising Chanoine wicket gates at La Grange Dam, February 2007. Courtesy of Rock Island District, U.S. Army Corps of Engineers.

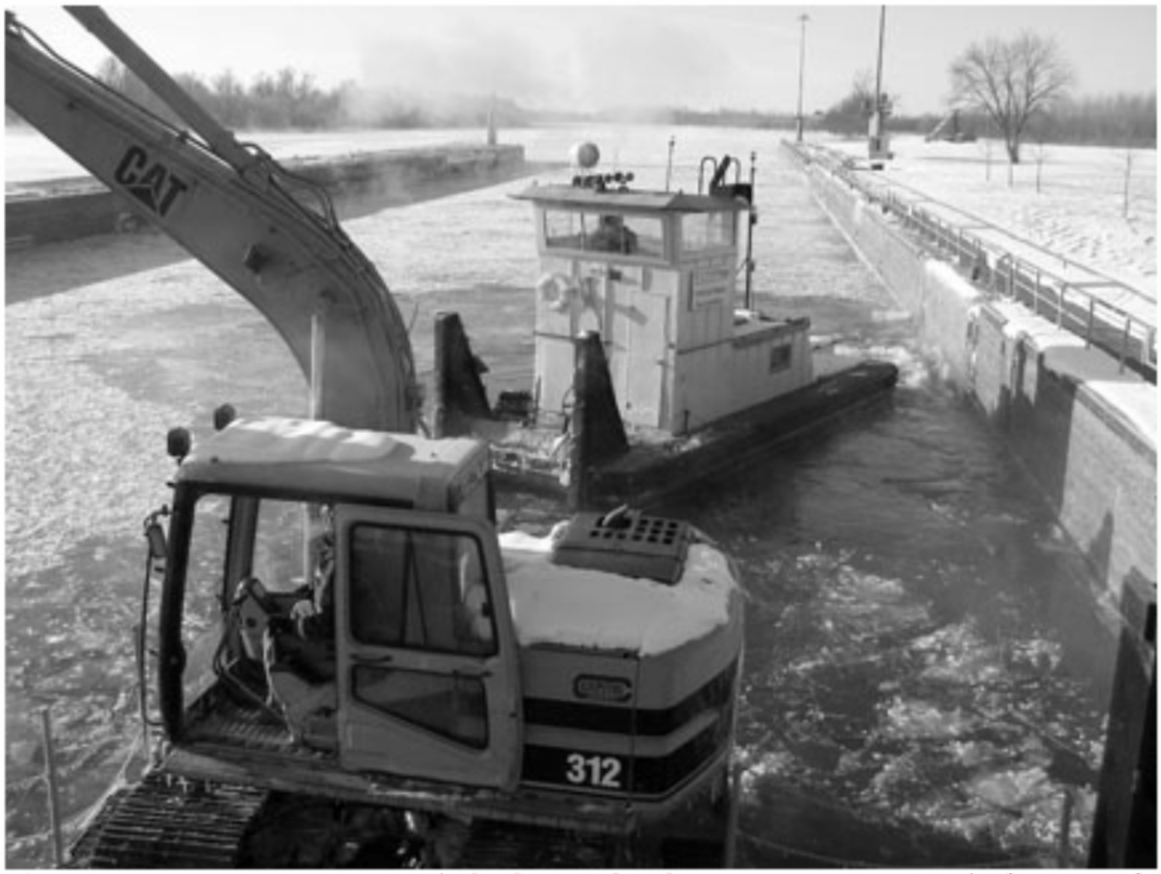

Figure 2: THE BEARDSTOWN in background and Maneuver Boat No. 1 in foreground, February 2007. Courtesy of Rock Island District, U.S. Army Corps of Engineers.

Figure 3: Maneuver Boat No. 1 dropping the Chanoine wicket gates at La Grange Dam, June 2007. Courtesy of Rock Island District, U.S. Army Corps of Engineers.